



GNSS International Activities Update

Civil GPS Service Interface Committee Meeting

Baltimore, MD

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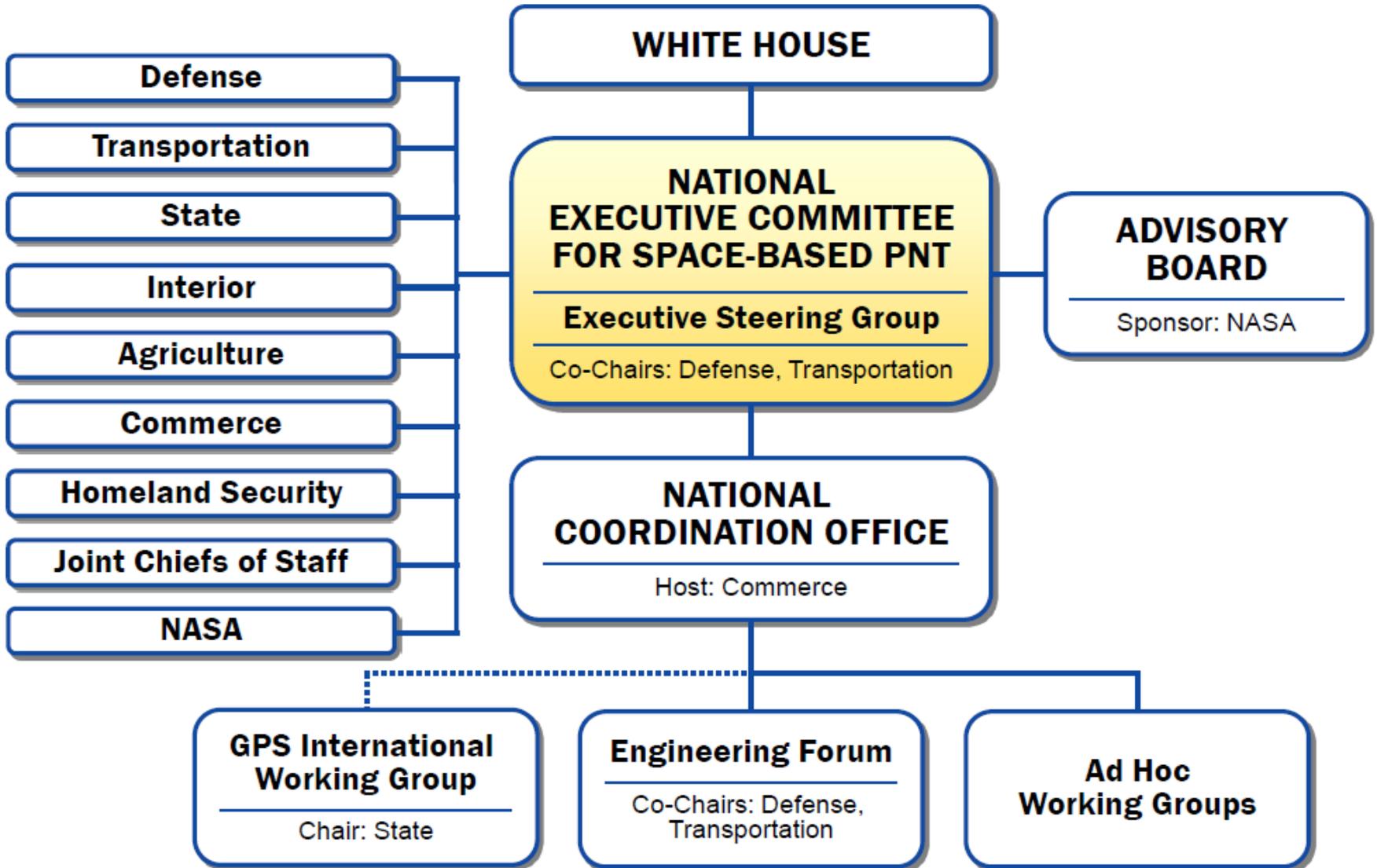
U.S. National Space Policy

Space-Based PNT Guideline: Maintain leadership in the service, provision, and use of GNSS

- Provide civil GPS services, free of direct user charges
 - Available on a continuous, worldwide basis
 - Maintain constellation consistent with published performance standards and interface specifications
 - Foreign PNT services may be used to complement services from GPS
- Encourage global ***compatibility*** and ***interoperability*** with GPS
- Promote transparency in civil service provision
- Enable market access to industry
- Support international activities to detect and mitigate harmful interference



National Space-Based PNT Organization





U.S. Policy Promotes Global Use of GPS Technology

- No direct user fees for civil GPS services
 - Provided on a continuous, worldwide basis
- Open, public signal structures for all civil services
 - Promotes equal access for user equipment manufacturing, applications development, and value-added services
 - Encourages open, market-driven competition
- Global compatibility and interoperability with GPS
- Service improvements for civil, commercial, and scientific users worldwide
- Protection of radionavigation spectrum from disruption and interference



Planned GNSS

- Global Constellations
 - **GPS (24+)**
 - GLONASS (30)
 - GALILEO (27+3)
 - BEIDOU (27+3 IGSO + 5 GEO)



- Regional Constellations
 - QZSS (4+3)
 - IRNSS (7)
- Satellite-Based Augmentations
 - **WAAS (3)**
 - MSAS (2)
 - EGNOS (3)
 - GAGAN (2)
 - SDCM (3)



U.S. Objectives in Working with Other GNSS Service Providers

- Ensure **compatibility** — ability of U.S. and non-U.S. space-based PNT services to be used separately or together without interfering with each individual service or signal
 - Radio frequency compatibility
 - Spectral separation between M-code and other signals
- Achieve **interoperability** – ability of civil U.S. and non-U.S. space-based PNT services to be used together to provide the user better capabilities than would be achieved by relying solely on one service or signal
- Promote fair competition in the global marketplace

Pursue through Bilateral and Multilateral Cooperation



Bilateral Cooperation: China

- Operator-to-operator coordination under ITU auspices for GPS & Beidou was completed in September 2010
- Following China Satellite Navigation Conference in 2011:
 - Workshop on GNSS conducted by the Chinese Academy of Engineering and U.S. National Academy of Engineering
 - Meeting between the CAAC and U.S. FAA focused on aviation satellite navigation issues
- On going cooperation with China Satellite Navigation Office (CSNO) and China National Administration of GNSS and Applications (CNAGA), on the margins of the International Committee on GNSS (ICG)
- Delegations from both nations met on May 19 in Beijing to discuss civil cooperation topics such as interoperability, service monitoring, interference detection, spectrum protection, and civil aviation applications



Bilateral Cooperation: Europe

- GPS-Galileo Agreement signed in 2004, ratified by EU in December 2011
 - Four working groups established under the Agreement
- Working groups continue to meet regularly as needed
 - Working Group B met in March & June 2014
- ITU coordination meeting - March 2014
 - Focused on Galileo compatibility with GPS III
- Bilateral Plenary meeting held June 2014 in Torrejon, Spain



Bilateral Cooperation: India

- U.S. – India Joint statement signed in 2007
 - Cooperation on GPS and GPS augmentations
 - Expanded effort to ensure interoperability between GPS and GAGAN
- ITU compatibility coordination – Meeting in early 2013
- U.S.-India Civil Space Joint Working Group (CSJWG) bilateral meeting held in Washington, DC in March 2013



Bilateral Cooperation: Japan

- Joint statement signed in 1998
- Cooperation focuses on compatibility and interoperability between GPS and Japan's Quasi-Zenith Satellite System (QZSS)
- Hosting of QZSS monitoring stations in Hawaii and Guam
- Annual plenary meeting held July 2013
 - Both sides reaffirmed close cooperation on GNSS issues, no major outstanding problems or issues
- GPS-QZSS Technical Working Group met in May 2014 to discuss compatibility coordination under the ITU auspices



Bilateral Cooperation: Russia

- GPS-GLONASS discussions ongoing since 1996, and Joint Statement issued December 2004
- Working group on search and rescue capabilities meets regularly
- Joint statements signed in September 2011 and June 2012 reaffirming intent to continue cooperation
- May 2012 request to consider hosting SDCM sites within U.S. territory to monitor GLONASS civil signals is still under review within the U.S. Government



International Committee on Global Navigation Satellite Systems (ICG)

- Emerged from 3rd UN Conference on the Exploration and Peaceful Uses of Outer Space July 1999
 - Promote the use of GNSS and its integration into infrastructures, particularly in developing countries
 - Encourage compatibility and interoperability among global and regional systems
- Members include:
 - **GNSS Providers (U.S., EU, Russia, China, India, Japan)**
 - Other Member States of the United Nations
 - International organizations/associations





ICG-8 Meeting in Dubai: Nov 10-14, 2013

- Interference Detection and Mitigation (IDM) Task Force established
 - Focus on developing a common set of information to be reported to GNSS civil service centers
 - Third IDM Workshop to be held in 2014 (ITU will host)
- Interoperability Task Force established
 - Focus on analyzing the results of the April 2013 U.S. hosted Interoperability Workshop
 - Additional System Provider-hosted Interoperability Workshops to be held in 2014
- Multi-GNSS monitoring: International GNSS Monitoring and Assessment (IGMA) Task Force to focus on:
 - Identifying what service parameters should be monitored
 - Defining the level and methods for carrying out the monitoring
- Consensus that achieving a fully interoperable GNSS space service volume would provide significant performance benefits that no single system could provide on its own

ICG-9 will be hosted by the EU in Prague, November 2014



Interference Detection and Mitigation Workshops and the ICG

- ICG recommendations resulted in two IDM workshops
 - June 2012 and April 2013
- IDM Task Force created under Working Group A at ICG-8 meeting in Dubai
 - China and U.S. are Task Force Leads
- Concrete outcomes and recommendations resulted from workshops
- Third IDM Workshop scheduled for July 2014



ICG Interoperability Workshops

- First Workshop held April 2013
 - Hosted by the U.S. in Honolulu
 - Result of ICG recommendation from Working Group A
- Two other workshops held in 2014
 - Russia hosted Workshop in April and China hosted Workshop in May
- IDM Task Force created under Working Group A
 - China and U.S. are Task Force Leads
- Goal of workshops is to get industry/user feedback on GNSS interoperability



Progress at ICG in GNSS Civil Service Provision

✓ Providers Forum

✓ Providers Forum System Report

✓ Principles of Compatibility, Interoperability, and Transparency

➤ Template for Performance Standards (and ICDs)

➤ *Postulated Performance Standards for future services*

- Service Assurances or
Commitments

- *Monitoring of service
performance*

- *Interference monitoring*



APEC GNSS Implementation Team (GIT)

- Established in 2002
- Promote implementation of regional GNSS augmentation systems to enhance inter-modal transportation and recommend actions to be considered in the Asia Pacific Region
- Reports to Transportation Working Group (TPT-WG) through the Inter-modal Experts Group (IEG)
- Adopted a GNSS Strategy designed to promote adoption of GNSS technologies throughout the Asia Pacific region, especially with regard to transportation
- 19th GIT meeting held April 2014 in Christchurch, New Zealand



Summary

- U.S. policy encourages worldwide GPS use
- International cooperation to ensure compatibility, interoperability, and transparency is a priority
- Progress continues multilaterally through ICG workshops
- Policy stability, service transparency, and continuous improvement are the keys to success in GNSS Programs



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